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ABSTRACT

This paper states that, although education has been linked historically to economic development, there is no clear evidence that this link is valid. It investigates under what conditions educational programs are likely to be effective and which are likely to shift resources without any net effects on employment, wage levels, productivity, or economic growth. This six-chapter issue paper examines several interpretations of economic development and analyzes their implications for the role of vocational education. The oldest approach to economic development, luring employment from neighboring localities or states ("smokestack chasing"), is the subject of Chapter 1. This notion has been superseded in many places by a superior one--that regions should increase employment by generating new employment. The different ways of enhancing employment in the aggregate are explained from either a macroeconomic approach (Chapter 2) or a microeconomic approach (Chapter 3). A new role for vocational education--customized training for specific firms--is the subject of Chapter 4, and technology transfer programs and small business development centers are the topic of Chapter 5. In the concluding chapter, these conceptions of economic development clarify what education programs can and cannot do to enhance economic development and clarify the conditions under which vocational education can be truly effective as a mechanism for economic development. An appendix discusses the microeconomics of vocational education. A 36-item reference list is included. (KC)

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SEPARATING THE WHEAT FROM THE CHAFF:
THE ROLE OF VOCATIONAL EDUCATION IN ECONOMIC DEVELOPMENT

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INTRODUCTION

Education has long been touted as a mechanism of economic growth. The report of the National Commission on Excellence in Education, *A Nation at Risk*—a report widely credited with instigating the "excellence" movement in education—promoted educational reform principally as a way of improving our international competitiveness. In days when the American economy was booming, during the 1960s, its growth was often attributed to increases in educational attainment.

Indeed, Horace Mann's efforts to promote universal public education in the 1830s used rhetoric about the economic effects of education that, except for the style, could have been written during the 1980s. As he declaimed to the Massachusetts Board of Education in 1848,

> The main idea set forth in the creeds of some political reformers, or revolutionizers, is that some people are poor *because* others are rich. This idea supposes a fixed amount of property in the community, which by fraud or force, or arbitrary law, is unequally divided among men....But the beneficent power of education would not be exhausted, even though it should peaceably abolish all the miseries that spring from the co-existence, side by side, of enormous wealth and squalid want....Beyond the power of diffusing old wealth, it has the prerogative of creating new. It is a thousand times more lucrative than fraud, and adds a thousand-fold more to a nation's resources than the most successful conquests. Knaves and robbers can obtain only what was before possessed by others. But education creates and develops new treasures—treasures not before possessed or dreamed of by any one. (Filler, 1965)

Vocational education in particular has always been promoted for its economic benefits. Since its inception, advocates have insisted that vocational education would not only benefit individual students, prevent high school dropouts, and create productive citizens in place of potential deadbeats, but also that it could resolve economy-wide problems like unemployment, lagging growth, and declining international competitiveness. Just as American leaders now point to the Japanese economy and its educational system as exemplars, advocates for vocational education at the turn of the century pointed to Germany's vocational system as the reason for its economic growth.

More recently, the National Commission on Secondary Vocational Education (1985) reasserted the economic value of vocational education, especially in a country where eighty percent of jobs do not require a college degree, and the community colleges offered their services to the nation's growth in "Putting America Back to Work" (American

Association of Community and Junior Colleges, 1984). A number of states have promoted their vocational education systems as mechanisms of economic development; the most notable has been North Carolina, which has expanded vocational education in its community colleges as part of an overall educational strategy for economic development. Many states have enacted their own job training programs, most of them explicitly intended to promote economic development in the state (Grubb & McDonnell, 1989), and at the local level community colleges have rushed to expand their offerings in areas related to new technologies, including computer programs, robotics, and energy-related programs (Grubb, 1984).

The popularity of education in general and vocational education in particular as mechanisms of economic development is widespread, then. The appeal of educational mechanisms is irresistible: They promise to accomplish so much at relatively low public expense; they offer a mechanism of economic development that, unlike the more centralized planning mechanisms of other advanced capitalist countries, is more consistent with the American version of capitalism and its limited government; and the view that our country has only its human resources to rely upon, and should develop those resources to their maximum, is a progressive view that individuals of all political backgrounds can support. Above all, in a world where at least some occupations have increasing educational requirements because of technological developments, it would be foolish to abandon education. Education may not be a sufficient condition for economic growth, but it is surely a necessary component.

But there are still serious problems in many of these claims. For example, *A Nation at Risk* quite correctly pointed out the declining economic position of the United States and the declining academic performance of students—but the link between the two was never demonstrated. Indeed, there is no reason to think that a mediocre educational system had much to do with the decline of American steel, or of the auto industry, or with the superiority of the Japanese in engineering and production. The academic literature demonstrating the link between education and economic growth, widely known in bowdlerized forms, also relies on weak logic. Differences in earnings between educated and uneducated workers at one time are applied to changes over time in educational attainments, as if the economic returns to education among individuals apply when educational attainments as a whole increase (for examples of this approach, see Jorgenson, 1984; Denison, 1979). More generally, our infatuation with educational attainment and

years of education now seems quite misplaced in a period when the *quality* of education is so much under fire.

For vocational education, the "excellence" movement and the recent emphasis on higher academic standards have come as serious blows, suggesting perhaps that vocational education is *not* an appropriate antidote to economic decline. Many of the recent national commission reports criticized vocational education, either implicitly or explicitly, and the business community—long a passive supporter—blasted vocational education as harmful to the more general preparation and the higher-order skills that business presumably now needs. As the Committee for Economic Development (1985) stated,

> Business in general is not interested in narrow vocationalism. In many respects, business believes that the schools in recent years have strayed too far in that direction. For most students, employers would prefer a curriculum that stresses literacy, mathematical skills, and problem-solving skills; one that emphasizes learning how to learn and adapting to change. (p. 15)

These recent attacks are part of a historically persistent criticism of vocational education for being overly narrow, too concerned with specific job training and not with broader and more flexible preparation (Grubb, 1979). These and other attacks on vocational education imply that its usefulness in promoting economic development might be quite limited.

There are, then, some problems with the simple faith that education in general and vocational education in particular are effective mechanisms of economic development. There are still other problems with common conceptions of economic development. As economic development has become the focus of a sacred quest, promising to generate benefits for all citizens and political support for education, the term has been widely and indiscriminately used as a promotional phrase or rhetorical flourish. Unfortunately, this widespread use has tended to empty the phrase of any specific content: It is often difficult to know exactly what economic development means, or why any particular program might enhance economic development, or what difference for public policies it makes to specify economic development as a goal, or what the special role of education might be within general policies designed to promote economic development. Above all, there is currently no real evidence about the effectiveness of different programs in enhancing economic development (however measured): While there are many examples of smoothly functioning programs, including vocational education and job training initiatives that have

improved relations between education and employment, their effects on development remain unclear.

The problem, then, is to separate the wheat from the chaff—to scrutinize more carefully our simple faith in education as a mechanism of economic development, and to determine under what conditions educational programs are likely to be effective and which are likely to shift resources without any net effects on employment, wage levels, productivity, or economic growth. In this issue paper we examine several interpretations of economic development and analyze their implications for the role of vocational education. The oldest approach to economic development focuses on luring employment from neighboring localities or states, a process often derided as "smokestack chasing" (currently a process of chasing clean, prestigious high-tech companies). While this approach to economic development, examined in chapter 1, has fallen out of favor, there remain powerful incentives for local institutions (like community colleges and technical institutes) and for states to continue this kind of activity. This conception of economic development has in many places been superseded by a different and decidedly superior idea: the notion that regions should increase employment not by stealing it from other regions, but by generating new employment. The different ways of enhancing employment in the aggregate can be explained from either a macroeconomic approach (developed in chapter 2) or, in greater detail, a microeconomic approach (developed in chapter 3) which often embodies the conventional view that education enhances the productive capacities of workers.

In the promotion of economic development, vocational educators have offered a special role for vocational education in several relatively new practices. In particular, customized training for specific firms, and technology transfer programs and small business development centers—the subjects of chapters 4 and 5—offer new models for job training and vocational education. Like the other approaches to economic development, they can be analyzed to specify more clearly where they should enhance economic development in the aggregate, rather than providing public subsidies to private firms without any new benefits being created.

These conceptions of economic development clarify what educational programs can do when they are justified in the name of economic development. They help identify not only the potential benefits of these approaches, but also some of the problems—including the possibility that programs designed to enhance economic development will have no effect on employment, earnings, or regional income. To be sure, increasing the quantity of

education, and especially improving its quality, can always be justified in many ways aside from economic rationales. The purpose of this analysis, then, is not to suggest that such improvements are not worthwhile, but that they cannot always be relied upon to lead to economic resurgence. Understanding these alternative conceptions of economic development is, therefore, a way to begin clarifying the conditions under which vocational education can be truly effective as a mechanism of economic development.

CHAPTER 1

LOCAL, STATE, AND FEDERAL INTERESTS IN ECONOMIC DEVELOPMENT: THE INCENTIVES FOR "SMOKESTACK CHASING"

In the past, a major strategy for economic development has been for states and communities to lower costs to businesses in order attract them from other states and communities. Most often this has taken the form of lowering or forgiving taxes or subsidizing interest costs through tax-free bonds like industrial development revenue bonds. Several states, following the lead of South Carolina in the early 1970s, have also established programs of subsidized training for firms moving into the state, to reduce training-related relocation costs. With the economic downturn of the 1980s, additional states enacted their own job training programs; virtually all states now have some kind of job training that emphasizes economic development, and many of them provide support for customized training (examined in chapter 4 below). (On these state-funded job training programs, see Grubb & McDonnell, 1989; Stephens, 1986, 1987.) The strategy of increasing the quality of the work force, articulated most clearly by North Carolina, can be interpreted as reducing the quality-adjusted costs of workers, and the programs to increase vocational education in specific fields may also operate to reduce costs of educated workers and, therefore, lure firms from other states.

Despite the popularity of such inducements, many of them—especially tax breaks—have been found to be ineffective, and various groups including the Advisory Committee on Intergovernmental Relations have tried to persuade states to abandon their schemes to lure employers (see, for example, Vaughan, 1979; Kieschnick, 1981; Advisory Commission on Intergovernmental Relations, 1981). The reason that tax abatements have been so ineffective is that firm location is much more sensitive to the location of consumer markets, labor costs, energy and raw materials costs, the level of union activity, and regulatory climate than to taxes, which are small components of total costs. But precisely because firm location does appear to be sensitive to wage rates, lowering quality-adjusted labor costs through education might be an effective way of attracting employment to a state, and indeed some empirical results indicate that states with higher spending on education do have higher growth rates (Plaut & Pluta, 1983). In the battle to attract high-technology employment in particular, the importance of a first-rate university has been a dominant theme; in addition, a survey of high-tech firms by the Joint Economic Committee (1982,

pp. 49–56) reported that ninety-six percent of respondents ranked the availability of technical employees as significant to location and eighty-seven percent felt the availability of professional workers to be central. However, other empirical analysis has not confirmed the importance of skilled labor to the location of high-tech firms and has found instead that the location of such firms is more widespread than is commonly thought (Glasmeier, Hall, & Markusen, 1983). It may be, as in so many other aspects of firm location, that the conventional wisdom about the importance of skilled technicians to the location of firms is incorrect.

One issue that remains unclear, then, is how effective education and particular types of vocational education are in luring employment from one area to another. Many—perhaps most—programs to attract mobile firms seem to make little effort to determine whether a particular subsidy will make much difference in where a firm locates. Most of the recently enacted state job training programs lack any mechanisms for establishing priorities for which firms to support,[1] and descriptions of economic development efforts include many stories of subsidies to retail establishments, real estate companies, and other firms which cannot possibly be "footloose." In addition, training subsidies may be crucial in some cases (particularly to smaller firms), and cooperation with a local education institution may be crucial to providing technically trained workers in areas where there are shortages; but in other instances the subsidies offered through training programs are relatively small, so that just as tax incentives have proved ineffective because of the small proportion of firms' costs they represent, educational inducements may be similarly ineffective. In the absence of good information about the conditions under which vocational education and job training induce firms to relocate, it would be appropriate for state and local programs to scrutinize their own efforts more carefully, to ask whether the firms they try to attract are indeed "footloose," whether training is crucial to their location decisions, and whether the size of the program or subsidy is large enough to affect their location decisions.

Although the effectiveness of educational mechanisms in attracting firms among states is still unclear, a rather different problem is even more crucial. The efforts of community colleges and local technical institutes to attract industry may only serve to relocate employment from one area of the state to another, and interstate competition for employment may increase the well-being of one state only at the expense of another. No real economic gains arise from luring a firm from one locality to another or from one state to another; indeed, the relocation costs as firms move their plant and equipment and as

some employees relocate—costs which are partially borne by taxpayers through the favorable tax treatment of depreciation and partially by employees who bear moving costs—make this kind of shuffling among regions inefficient.[2] Finally, the distribution of the benefits from such inducements is potentially uneven: If a state's education and training program lowers the wages for trained workers and causes firms to relocate from other states, then no real efficiencies have been created; but firms have been able to use state policy to lower their employment costs so that employers gain but workers do not.

There is, to be sure, two cases where this kind of "beggar-thy-neighbor" policy may be justified. One is the example of providing favorable treatment for a poor region compared to its neighbors, to lure employment from relatively wealthy to poorer regions. The problem of unequal regions is both an interstate problem and an intrastate issue, since states might want to relocate employment from low-unemployment suburban areas to high-unemployment central cities, and a large state like Texas might try to locate employment in the depressed Valley rather than in the Dallas or Austin areas. Similarly, the federal government has sometimes articulated a policy to develop particular regions of the country; the Appalachian Regional Commission and the Tennessee Valley Authority are two examples. However, the ability of the federal government to use incentives selectively—to make incentives for employers available to Mississippi, but not to Massachusetts—is limited, and most states seem to have been concerned more about development of the state as a whole rather than balancing substate regions. Indeed, existing policies may even exacerbate regional inequalities: Wealthier states are in better positions to lure firms through state subsidies, and in some areas suburban communities have been successful in attracting employment from central cities with packages of subsidies including community college training (Mertes, 1988).

Another potential justification for smokestack chasing involves diversification, which has often been a goal of state economic development efforts. If two neighboring regions are each specialized in different industries, each will be subject to the booms and busts of that particular sector. However, if each can diversify by luring employment from its neighbor, then each region will be better off—that is, less vulnerable to the cycles and the vagaries of particular industries—even though there is no new employment. Aside from these two cases, however, it is difficult to justify efforts to attract employment from one region to another.

The problem with smokestack chasing is that the incentives for economic development at different levels of the existing system are inconsistent. Community

colleges and technical institutes are local institutions, serving primarily their own communities rather than the state as a whole or the nation; anything they can do to increase local employment enhances their status within their community, even if it is detrimental to the state or nation as a whole. Similarly, states have their own interests first and foremost, and no governor will get much benefit from deferring to a neighboring state in a battle over the location of a major manufacturing plant. The only solution to this kind of inconsistency is for state governments and the federal government to develop mechanisms to detect beggar-thy-neighbor approaches and to prevent their own resources from being used for such purposes.[3] For example, for customized training supported with state resources, states could require "state impact analyses" (akin to environmental impact analyses) showing that employment would not simply be drawn from one area of the state to another, or statewide balance sheets establishing the costs and benefits for the state as a whole. Similarly, the Economic Development Administration and other federal programs are now prohibited from financing plant relocations, and federal policy could extend this prohibition on efforts which simply lure employment from one state to another (on different policies to inhibit recruitment among localities or states, see John, 1987, pp. 125–128). For example, early drafts of the legislation to replace the Carl D. Perkins Vocational Education Act contained the following provision:

> No funds provided under this Act shall be used for the purpose of directly providing incentives or inducements to an employer to relocate a business enterprise from one State to another State if such relocation would result in a reduction in the number of jobs available in the State where the business enterprise is originally located.

To be sure, the enforcement of such provisions would be difficult, and eliminating all federal incentives for smokestack chasing would be similarly hard because restrictions would be necessary on depreciation in the corporate income tax code and on the use of industrial revenue bonds, which have often been used by states and localities to subsidize capital costs in the hopes of luring firms. Nonetheless, a federal policy on this kind of economic development would at least provide a clearer signal about undesirable practices.

Within the past decade, many states and localities have come to understand that the attempt to lure firms from other regions with various incentives is expensive, potentially ineffective, and ultimately unproductive because such efforts simply redistribute employment without increasing it. It is now popular to claim that smokestack chasing is outmoded, and that a somewhat different conception of economic development has replaced it—one that stresses the prevention of job loss to other regions. (According to John, 1987,

"the new style of state economic development initiatives is less likely to be zero-sum" [p. 81].) This conception has been especially important in declining regions like the northern states, which have seen firms move to southern and western states, and in areas based on manufacturing, which have seen employment shift to services and abroad. The prevention of job loss generally operates much as the efforts to lure employment do, by reducing the costs of production to offset any cost disadvantages of a particular area.

One obvious question is which efforts to keep firms in an area are likely to be effective. As in the case of smokestack chasing, only mobile firms should be the target of such efforts, and the incentives to stay must be reasonably related to the incentives to move. In addition, only those firms which are likely to move should be subsidized in this way. Contrary to this obvious point, anecdotal evidence suggests that firms are sometimes able to win concessions from localities by threatening to move when they have no intention of doing so, or winning concessions and then moving anyway a few years later. The desperation of some states and localities to do anything feasible to foster economic development has led to some programs that probably make no difference to whether firms leave or stay.

The efforts to prevent job loss has one obvious advantage over smokestack chasing: It can prevent the costs of dislocation—transportation costs, but also the costs of adjustment associated with having some areas decline while others are booming—incurred as firms move from one area to another. In addition, many efforts have tried to keep employment from moving abroad, and so they are unambiguously beneficial to the country as a whole—especially if a firm that would otherwise move abroad generates other employment in suppliers, firms using its products, or wholesalers and retailers to which it is linked. However, preventing job loss still has the zero-sum aspects of smokestack chasing: There is little net new employment, but instead a reallocation of employment. If that allocation is intrastate or interstate, then the benefits of this kind of economic development to the state or the nation are limited.[4] As a result, the most hopeful conceptions of economic development that have replaced smokestack chasing have been those stressing *employment creation*, often referred to as "growing your own" employment, rather than the spatial reallocation of existing employment. In the next two chapters we address the macro- and microeconomics of such efforts.

Notes

[1] However, there are some notable exceptions. Alabama, Illinois (in its High-Impact Training Services program), Louisiana, Michigan, Missouri, New Mexico, Oklahoma, Texas, Vermont, and Virginia all give preference to manufacturing firms over others, and Iowa does not subsidize health, retail, or professional firms. We can interpret these limitations—especially those of Iowa—as efforts to distinguish mobile firms who might be influenced by training subsidies from those which are necessarily tied to population locations and which are therefore unlikely to be influenced.

[2] In fact, if government inducements cause firms to shift from locations which are efficient, considering proximity to markets, raw materials, transportation, and the like, then they may again cause inefficiencies in the economy as a whole, even if some states and firms benefit.

[3] This recommendation is similar to the call for different levels of government to sort out their respective roles in economic development; see John (1987).

[4] There is another possible negative effect of this approach to economic development: If firms generally move from high-wage to low-wage regions, then efforts to preserve employment in high-wage regions will hamper the process of equalization among regions. For evidence on the marked patterns of convergence among regions in earnings, see Grubb & Wilson (1989).

CHAPTER 2

THE MACROECONOMICS OF ECONOMIC DEVELOPMENT AND THE POTENTIAL ROLE OF POSTSECONDARY VOCATIONAL EDUCATION

Most conceptions of economic development rely on some kind of macroeconomic model, usually implicit. It is worth being explicit about the model because then the underlying assumptions, and the mechanisms by which a particular approach to economic development works, are made clear. On the other hand, because macroeconomic theory is riven by unresolved controversies, no model—especially not a simple one—will command universal assent. Despite the fact that any model will itself generate controversy, it is worth clarifying the macroeconomic effects of many approaches to economic development.

Figure 1 depicts a simple macroeconomic model, omitting the complexity and the dynamic adjustments necessary in a more complete model, that nicely illustrates a range of economic development policies. The demand curve *AD* describes aggregate demand in the economy as a whole, which decreases as the price level increases. Aggregate supply, described in the supply curve *AS*, increases as prices increase (at least in the short run), though at some point—where the productive capacity of the economy is reached—the supply curve becomes almost vertical as further efforts to increase supply result in greater price increases and escalating inflation but not any additional production. Where demand and supply intersect, the price level and the level of economic activity (gross national product, or regional product if we apply this model to a regional economy) are in equilibrium.

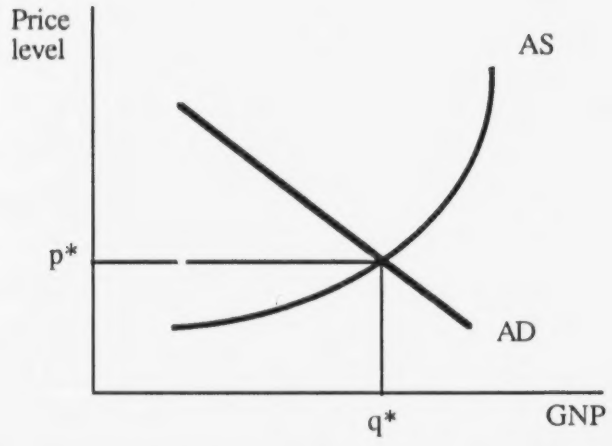


Figure 1. Aggregate Demand and Short-Run Aggregate Supply

Demand-Side Policies

From this simple model, economic growth as measured in increases in GNP can occur either if the demand curve shifts outward—demand-side macroeconomic policies—or if the aggregate supply curve shifts outward in what have become known as supply-side policies. The usual demand-side policies which increase aggregate demand include many of the usual macroeconomic policies: increased government spending or reduced taxes, increased exports or decreased imports, efforts to lower the interest rate to increase investment, or policies to increase the tendency of individuals to consume—a recommendation which has not been generally advocated as a matter of public policy (though it occurred during the 1980s as the rate of savings fell). These approaches can be applied to regions as well as to nations—except that certain policies available to a national government, especially monetary policy, cannot be used at the regional or state levels. However, many regional development strategies are still the same. One is to increase the government spending in a region, but without increasing its taxes—which happens when the federal government provides grants to depressed regions of the country like Appalachia or low-income urban neighborhoods. For the country as a whole, however, this cannot be particularly effective since grants to one region must be balanced with taxes to other regions. (This ignores the balanced-budget multiplier, which has recently been very little discussed.) Another strategy is for a region to increase its investment, which states and localities often try to do by luring investment from neighboring states and regions—the subject of the previous chapter.

The remaining demand-side strategies are to increase exports and decrease imports. Any strategy which can do that will increase employment and earnings in the region, and decrease the earnings which must be paid to other regions for imports. Both export promotion and import substitution—trying to produce locally the goods and services that might otherwise have to be imported—are prominent development strategies, at both the federal and the state level.

There are many different ways of enhancing exports and reducing imports, including educational policies. For example, any strategy that would reduce the costs of producing goods and services in export and import sectors would increase exports, reduce imports, and then enhance regional production and income. Improving the quality of education or subsidizing the training of workers in these sectors would be among the ways to reduce such costs, for example; therefore, improving the educational system or

providing training to firms—including the customized training examined in chapter 4—would be appropriate strategies.

This simple model clarifies the idea that regional development efforts must be sector specific: They must apply only to those sectors which produce exports or which would substitute for imports. This in turn implies that educational policies to further economic development must also be sector specific—for example, by focusing on workers in export sectors like agriculture, raw materials like lumber and minerals, manufactured goods which are exported from the region, certain business services (in large financial centers like New York or Los Angeles), or sectors which might reduce imports. The corollary is that policies to support sectors unrelated to exports and imports—like retail and wholesale trade, many business and personal services, and sectors that produce for local consumption—do not raise aggregate demand or employment.

The idea of sector-specific education and training policies is generally unfamiliar, however. Such an approach would require choosing particular sectors and denying the benefits of education and training to others. A concrete example of such a policy is that a customized training program might provide firm-specific training to an agricultural producer or a manufacturer, but not to retail stores, to hotels and restaurants, to the real estate sector, or to banks which are largely regional in their business. Quite apart from the politics involved in such a selection, a decision about which sectors are *potentially* import-reducing would be difficult. In addition, vocational education and job training usually prepare workers for particular occupations, and most occupations are found spread across a number of sectors—both those that export or import and those that do not. It, therefore, becomes quite difficult, both politically and technically, to apply this version of an economic development policy.

This model clarifies the idea that many vocational programs developed in the name of economic development are quite poorly targeted, because they fail to distinguish among sectors; for that reason they may be quite ineffective in promoting regional economic development. A further implication is, once again, that some economic development strategies that are rational from the perspective of a particular region may be pointless from a national perspective. That is, if one region or state enhances its exports and in so doing contributes to declining exports of another region, then the country as a whole will not be any better off. From this perspective, the only policies that are worth pursuing are those that increase exports to other countries and reduce imports from abroad.

Supply-Side Policies

The policies mentioned so far operate only by shifting the aggregate demand curve in Figure 1. Other policies—including most education policies—would operate instead to shift the aggregate supply curve, or the amount which an economy can produce at a given price level. The most prominent of these education policies would be an expansion of the number of well-trained workers. Assuming that such training makes workers more productive—in ways to be further described in the next section—this approach would increase the supply of goods available with a given labor force, and a shift in the supply curve *AS* to the right; the result would be a higher level of GNP (or regional product) and a *lower* price level.[1] Thus the powerful appeal of supply-side policies: They promise economic growth without the price increases and inflation which may accompany demand-side policies.[2]

This simple macroeconomic model, therefore, suggests two different ways in which vocational education might enhance economic growth: as part of a strategy to increase exports or reduce imports, an approach which requires sector-specific policies; and as part of a strategy to increase the productivity of the labor force, as a way of expanding the aggregate supply of goods that are possible with the resources that any economy has at its disposal. There is still a third approach to the role of vocational education implicit in Figure 1. If aggregate demand increases in any economy—from any of the fiscal, monetary, or export-oriented policies commonly used—then output and employment may increase but at the expense of increasing prices and inflation. This reflects the fear, so prominent in discussions about national economic policy, that there is a trade-off between unemployment and inflation, and that efforts to reduce unemployment will inevitably lead to inflationary pressures that will themselves cause subsequent economic contraction. However, if the aggregate supply curve shifts at the same time as aggregate demand increases, then there can be economic growth without price increases and inflation. This suggests a matching of supply-side and demand-side policies, or a coordination of education and training programs with other efforts—enhancing exports or improving transportation and infrastructure, for example, or providing training for specific sectors which undergo expansion. Some states have tried to develop such coordination, for example, by locating job training programs within state offices of economic development rather than in education agencies.

Unfortunately, the analysis in Figure 1 is too aggregated to yield much more guidance about the specific kinds of vocational programs, for particular occupations and sectors, which might be most effective in economic development. Any additional guidance must come from disaggregating the aggregate demand and supply functions and concentrating on the more detailed aspects of demand and supply.

Notes

[1] A more controversial view assumes that the supply curve in the long run is rather different from that in Figure 1. One reason that the aggregate supply curve increases as prices increase is that, as long as prices increase faster than wages, firms will find it profitable to increase production when prices for their output increase. However, in the long run higher prices should lead to higher wages and other costs for inputs, so that higher prices are matched by higher costs and the incentive to increase production to raise profits vanishes. In this case the aggregate supply curve is a vertical line; the price level is determined by monetary and fiscal policies, which shift the aggregate demand curve, while the GNP which results is the full-employment level of GNP. In this case, the *only* way in which there can be GNP growth is through shifts in the aggregate supply curve. The assumptions underlying this model, and the conclusion that in the long run the economy is always at its full-employment level of GNP—rather than having substantial unemployment of both human and capital resources—are controversial, however. For our purposes, it is sufficient to note that, no matter whether the aggregate supply curve has some elasticity, as in Figure 1, or is perfectly inelastic, supply-side policies—including programs to increase the productivity of the labor force through education and training—will increase GNP.

[2] This analysis ignores the best-known supply-side policy: the proposal that tax cuts would so increase investment and productivity as to shift the aggregate supply curve to the right. In reality, the evidence suggests that such tax cuts have a negligible effect on aggregate supply, though they do shift the aggregate demand curve to the right and therefore have some effect as conventional Keynesian policies.

CHAPTER 3

CONVENTIONAL WISDOM AND THE MICROECONOMICS OF ECONOMIC DEVELOPMENT

Given the macroeconomic model of the previous section, the crucial question is when education in general, and vocational education in particular, might increase the supply of goods and services that can be produced with a given labor force. The most conventional view about education assumes that formal schooling and job training instill competencies which increase the productivity of individuals; then individuals with these competencies earn a premium for them in the labor market. This view, formally codified in human capital theory, is quite close to Horace Mann's pronouncement and underlies most common statements about the effectiveness of education. Thus educating an ignorant person replaces a relatively unproductive person with one who is more productive. Furthermore, the benefits of such training accrue not only to the individual trained but also to other workers, as when the productivity of engineers is increased by having more competent technicians or more intelligent production-line workers. Increased productivity also makes it possible either to increase profits or to decrease prices of products and increase sales, or both, benefitting employers as well as employees. The potential of education is, therefore, to create employment for some who were previously unemployable, to increase the earnings of individuals educated, to increase the productivity and earnings of other workers, and to increase profits—a marvelous scenario.

Furthermore, in the human capital model there is a mechanism to assure equilibrium: As long as there are economic returns to more education, or to a particular type of education (like vocational education), informed individuals will enter that type of training; but if the market is flooded with individuals of a particular type then wages to those occupations will fall, fewer students will gain the education necessary for those occupations, and the excess supply will be eliminated. On the other hand, individuals whose training does not increase their productivity—because training is out of date, instructors are inept, methods are out of date, or programs are out of step with labor market demand—will not earn higher returns, and no students will apply to these programs. Thus the model implies that poor instruction and bad planning will be eliminated by students "voting with their feet." Economic incentives and disincentives then establish an equilibrium between demand and supply in every occupation, and for every level of education.

However widely accepted this view, there are several flaws. One obvious one, of course, is that the corrective mechanisms of the human capital model may not work very well, particularly if students are poorly informed about labor markets; then time in school may not lead to more productive capacities, and vocational programs may train students for declining or obsolete occupations. It is important, therefore, to assure that what is taught in school is consistent with labor market demand. Much of the concern with the content and planning of vocational programs represents a search for institutional mechanisms to assure the economic productivity of vocational education, replacing market mechanisms that are likely to be ineffective.

For our purposes the most important flaw is that the conventional view says nothing about the demand for educated labor; the existence of job opportunities for well-trained workers is usually assumed.[1] But a simple thought experiment reveals that this assumption cannot possibly be true. If engineers are more productive than other workers, and Japan is superior because of its relatively large numbers of engineers, it then follows that we should redirect massive numbers of students from business schools (for example) to engineering schools. But even if we had the political will to do this, many engineering students would not find jobs as engineers because of how American business is currently organized, and they might end up as very well trained technicians. Those that did find jobs as engineers would find that engineering salaries had fallen because of the glut of new entrants. For both reasons the expected return to engineering would fall, and another generation of students would resist entering that occupation. There might be benefits to expanding engineering schools, but they would not extend to every graduate, and there might even be some negative consequences from falling salaries.

More generally, in the conventional analysis of labor markets, the expansion of vocational education increases the employment of skilled workers by increasing the supply of workers with skills and decreasing the wages they must be paid, allowing employers to hire more of them. The wages of workers who have been educated increase, from the lower wages paid untrained workers to the higher wages paid more skilled (and presumably more productive) workers, and employment in more productive occupations increases so that economic development has apparently taken place. (This analysis can also be formalized with simple microeconomic models, which are presented in the Appendix.)

There are other possible effects of vocational education, some of which are potentially detrimental. Because expansion of vocational education increases employment

by increasing the supply of trained workers and decreasing wages, newly trained workers may gain, but previously trained workers may see their wages decrease with the influx of newcomers.[2] Indeed, total earnings of trained workers can even fall if the decrease in wages is too great (this will happen if the elasticity of demand for trained labor is, in absolute terms, less than one; see Figure A1(b) in the appendix). Furthermore, while there is generally more employment in skilled occupations from an expansion in vocational education, the increase in employment will not be as large as the number of workers newly trained: Either some of those newly trained do not find employment in the areas for which they have been trained—a constant problem in vocational education, leading to a concern with placement rates—or some of those formerly working are displaced by newly trained workers, a displacement effect that may be difficult to measure. The employment effects of an expansion of vocational education will be smaller if demand by employers is relatively insensitive to wages paid—if employers are unwilling to hire substantially more trained workers when there is an increase in supply. In this case employers benefit from the fall in wages, but several conventional measures of economic development—especially the unemployment rate and total earnings—would not show any improvement. Conversely, the employment effects will be high (and the effects on conventional measures of economic development relatively great) if employers are highly sensitive to wages. For what kinds of positions are employers likely to be relatively sensitive to wages? If there are many possibilities for substituting one type of employers for others, or for substituting capital for other inputs, then demand will tend to be relatively sensitive to price; limited possibilities for substitution imply demand that is relatively *insensitive* to price. In the case of high-tech employment, many mid-level workers—the technician- and technologist-level occupations that are the usual targets of vocational education—may be tied in relatively fixed proportions to capital or computer-driven systems, so possibilities for substitution are limited and the demand may be quite insensitive to price. This raises at least the possibility that high-tech occupations—those that have been the focus of many economic development efforts—are precisely those for which vocational education is likely to make the smallest impact on employment. While the facts about demand patterns are murky, this model highlights the importance of knowing a great deal about labor market demand before investing in vocational education.

This analysis complicates the evaluation of vocational education. Vocational education (or any type of education with value in production) is most effective in increasing the wages of students, and increasing employment in a specific occupation, when employers are willing to increase their employment without decreasing wages very much. Conversely, when demand by employers is relatively insensitive to wages, or when

employers will expand employment only when wages fall sharply, then expanding training programs will cause wages to fall but will not increase employment in skilled positions by much. In particular, this will be the case in areas where unemployment is high and where production has been declining. In order to devise successful vocational programs, it is, therefore, necessary to know a good deal about patterns of prospective demand and to expand programs only for those occupations for which demand is relatively sensitive to wages.[3]

Retraining

Another attractive strategy is to use vocational education to provide retraining, especially for workers displaced by firms or sectors closing down. Analytically, retraining is precisely the same as the problem of providing vocational education to unskilled workers, because displaced workers—those who have lost their jobs through technical change or the movement of firms, and who are unlikely to find employment in their own occupations—can be considered unskilled workers with respect to the occupations (including the emerging occupations) for which training is required. Therefore all the problems associated with different demand patterns—including possibilities of small employment effects and declining wages when demand is insensitive to wages—are problems for retraining as well as initial training.

The difference in the case of displaced workers is that they have work experience and presumably have already developed the work habits that employers find valuable. In addition, if some of their previous job skills are relevant in new occupations, the cost of training them is likely to be lower. Thus there may be real economies of training costs, and retraining may look more effective as a mechanism of economic development than the initial training of inexperienced and unskilled individuals. Nonetheless, it is important to remember that, in the absence of appropriate demand, retraining may still be ineffective in increasing employment and wages.

Eliminating Shortages

Another commonly mentioned purpose of vocational education is to eliminate shortages of particular types of labor. For example, the "Putting America Back to Work" project of the American Association of Community and Junior Colleges has emphasized

preparation for "skill shortage areas of employment opportunities, particularly in high-technology occupations" like computer analyst and programmer, computer software engineer, and electronic technologist. To the extent that shortages of crucial workers develop, entire sectors may be constrained, and so vocational education may stimulate economic development by unstopping bottlenecks in production.

However, the existence of shortages raises questions about why they develop in the first place, and why labor markets can't eliminate them through the usual mechanism of increasing wages without the need for public intervention. The persistence of shortages for nurses provides an example of an occupation where low wages have been blamed for shortages, yet wages have not risen relative to other occupations in order to attract more individuals into nursing and to prevent their leaving. In this situation, publicly provided training may be a substitute for the usual wage adjustments—that is, increases in the supply of nurses obviates the need for hospitals to increase wages to attract more nurses (or retain those they have).

This is a scenario in which public education programs meet every shift in demand with an increase in the supply of workers, so that employers need not increase wages. Although trainees benefit from increasing employment, employers also benefit substantially because they need not increase wages in order to expand their employment of skilled workers. (Figure A3 in the Appendix provides details about the distribution of benefits.) Indeed, one interpretation of why employers have so often raised the specter of skill shortages, even in cases where no shortages appear to exist, is that such alarms may induce public officials to increase vocational education programs and prevent employers from having to increase wages.

Another reason why shortages might develop is that there are nonprice barriers to increasing the supply of workers; that is, even if wages are increased, the supply of workers increases only slowly, or not at all. One common reason for such supply limitations, in high-tech occupations in particular, is the limited pool of students with enough science and math, leading to proposals for increasing the teaching of science and math throughout the elementary and secondary grades. Since this is a long-term solution, efforts to increase enrollments in relatively technical vocational programs may be necessary to eliminate shortages in the short and medium run.

A third kind of supply limitation is the lack of information about job opportunities that would allow new workers to enter the market in which shortages occur. If this is the

problem, the appropriate solution is not vocational education itself but information, including adequate vocational counseling at the secondary and postsecondary levels. However, the high-tech field has become glamorous, and it seems implausible that students are unaware of opportunities; indeed, at the postsecondary level students have been flocking into high-tech subjects, perhaps in greater numbers than job opportunities available (see Grubb, 1984).

Finally, changes in the locus of training can lead to shortages of certain kinds of skilled workers, at least for some periods of time. One example involves the skilled craft workers which used to be plentiful in some New England manufacturing centers. With retirements, out-migration of young people, unstable employment, and changes in technology, the traditional forms of informal training mechanisms—including on-the-job training and fathers teaching their sons—have been disrupted; but the process of turning to the educational system for equivalent training may be slow and uncertain, leading to shortages in skilled workers (Doeringer, Terkla, & Topakian, 1987, chap. 7, describes education as one of the "invisible factors" required for local economic development). Another example may come from product cycles: When new products and technologies are introduced, only a few firms hire certain kinds of workers, so training is essentially firm-specific and provided by the firm on the job. As any new technology (or product) becomes widespread, however, the skills required become less firm-specific and more general, and training must shift out of the firm and into generally available education and training institutions (Flynn, 1987, 1988).

The use of vocational education and job training to remedy skill shortages is one of the most attractive and common approaches to the use of education in economic development. However, this tactic requires the identification of labor markets in which demand is shifting and shortages are likely to develop—and existing economic development efforts often neglect to investigate the dynamic nature of demand.

The Effects of Vocational Education on Other Wages and Profits

Typically, the benefits of vocational education—indeed, of any type of education—have been measured by the earnings and employment of those trained. However, this approach is potentially incomplete. If skilled workers increase the productivity of other employees, or of capital, then any increase in the supply of skilled workers will increase

the wages of *other workers*, and may increase the returns to capital (or profitability) as well. The total social benefit from the expansion of vocational education is captured not only by those individuals trained, therefore, but by other workers, by the owners of capital, and even by consumers in the form of lower prices. Indeed, it is possible to show that the greater the effect of vocational education in increasing the productivity of other employers and capital, the greater the benefits that will accrue to these other factors of production, and the smaller the wage increase for those who complete the vocational program (that is, complementarity with other factors of production makes the demand for one type of worker less elastic, as in Figure A1(b); see Stern and Grubb, 1988).

A particularly concrete example of an occupation that enhances the productivity of others is a crane operator in a construction project. The crane operator performs tasks that could not be done by other people and is not a substitute for other construction workers, but instead is complementary to them. Training more crane operators will tend to reduce their wages, making it possible for contractors to include more hours of crane operators' time in their construction plans. This will also make it profitable to plan on using more time of other construction personnel who work alongside the crane, making the construction operation go faster and increasing the productivity of the construction crew. Existing crane operators do not benefit if the number of qualified operators increases as a result of the training effort, but the payroll for other construction workers becomes bigger, and users of newly constructed buildings or infrastructure benefit from lower construction costs.

Surprisingly, however, the distribution of benefits can be quite different if a training program prepares people for an occupation that substitutes for other kinds of employees. For example, engineering technicians are trained to perform tasks formerly done by engineers. The presence of a larger number of qualified technicians, therefore, makes it profitable for employers to hire fewer engineers. Indeed, the only way a large increase in the number of engineering technicians can be absorbed without a large reduction in technicians' wages is for technicians to replace some engineers. The reduced demand for engineers will exert a downward influence on engineers' salaries. In contrast to the other construction workers, whose earnings are increased by the training of more crane operators, engineers' earnings are likely to decrease as a result of training more technicians. Consumers are likely to benefit from lower production costs in both cases.

These examples imply that using trainees' earnings as the only measure of economic benefit from training may be misleading. The net economic benefit also includes

gains or losses to existing members of the occupation for which training occurs, gains or losses to members of other occupations, gains to employers, and any gains to consumers. Some efforts at economic development could operate, then, by providing vocational education to workers who would enhance the productivity of others, even though those receiving the training might themselves not be especially well paid. Unfortunately, the benefits to others are difficult to measure and have almost never been considered in the past.

The Effects of Vocational Education in Increasing Demand for Skilled Workers

A rather different scenario for the role of vocational education in economic development recognizes that technologies change and thereby shift demand. In particular, the availability of well-trained workers at lower wages may cause the next generation of technology to use more skilled workers, increasing the demand for training. Particularly if increasing demand for educated labor is matched with declining demand for untrained workers, this vision of training-led economic development provides benefits to workers and employers alike. Indeed, many of the claims that new technologies will use more highly trained workers, often in conjunction with new technological developments and new ways of organizing work, are implicitly following this model (see, for example, the discussion of the "renaissance technician" in Rosenfeld, 1986).

This strategy for economic development might be viewed as a labor-oriented component of a rational "industrial policy." Lester Thurow (1985, chap. 9) has argued that most governments with industrial policies seek to keep the real costs of capital low, as a way to spur investment (including investment in new technologies). Such a policy has the potential for stimulating labor-saving technical change that reduces employment and wages. Similarly, a policy of increasing the supply of well-educated labor and reducing the wages of skilled workers (but not of unskilled workers) might trigger a form of technical change more beneficial to workers: Low-cost capital and low-cost skilled workers in tandem might spur the development of technologies using more capital *and* more skilled workers. In fact, most authors in favor of a strategy of enhancing education as a path to a technologically advanced and productive society assume that technological change will follow the availability of skilled labor.

One question about this education-led, supply-side strategy is whether and how much technology will shift to skill-intensive methods if the wages of trained workers fall, a question with no clear answer. Another involves timing: If the supply of skilled workers is increased to stimulate technological change, but if technological change is relatively slow to develop and to diffuse, then a generation of highly skilled workers will face relatively low demand, the returns to education will fall, and another generation of prospective students will not find it worth their while to invest in education. This kind of lag, undermining the effectiveness of an educational strategy, may not be as severe if—as some have argued—the pace of technological change and diffusion have quickened, but it remains a problem still. (Indeed, the slowness of technological diffusion is one of the problems leading to technical assistance efforts, described in chapter 5.) A solution, to be sure, is to try to coordinate increasing demand with increasing supply of educated workers—but this implies serious efforts to manipulate demand for employment as well as supply, often the basis of "industrial policy."

"Industrial policy" has generally been seen as the purview of the federal government, not of states and localities whose individual influences on wages and on technological change are likely to be small. However, there is one important case in which state and local efforts to increase the supply of skilled workers through vocational education can induce technical change at the state or local level. Many firms—especially small and medium-sized firms—that have not yet adopted advanced technologies may have failed to do so because of shortages of skilled workers at wages they are able to pay; indeed, the lack of sufficient skilled workers is the most common factor such firms cite for not adopting new technologies (Jacobs, 1989). Such cases may, therefore, merit increases in vocational education and job training. However, such programs can be justified only for skilled workers necessary for developing technologies that have not been adopted by firms within an area, and not for occupations for which there is no link to emerging technologies (like personal service workers, many conventional craft workers, or managers and retail occupations) nor for firms which have already decided to use a particular technology.

Conclusions: The Need for Targeting

Vocational education has great promise as a mechanism of economic development, since—in terms of the simple macroeconomic model of the previous section—it has the potential for enhancing productivity, increasing the supply of goods and services that can

be produced with the resources available, increasing GNP (or regional product), and doing so without increasing prices or inflation. However, vocational education does not *automatically* lead to such benefits, as the microeconomic models described in this section clarify, particularly since the nature of demand limits the potential effects of vocational programs. If demand is insensitive to price, then the overall increases in employment from either training or retraining are likely to be small, and wages may fall in response to an increase in vocational programs; therefore, vocational education which is intended to increase employment and wages must focus on those occupations for which demand is sensitive to wages. The retraining of displaced workers, while it has certain advantages over the training of new entrants, similarly requires that training be targeted on occupations with sufficient demand. The use of vocational education to alleviate skill shortages is another common response with potentially substantial effects on employment, particularly in cases where skill shortages are caused by institutional rigidities; but this approach again assumes that vocational programs are targeted only on those occupations for which skill shortages are known to exist—and not merely on occupations for which employers complain about their inability to find enough workers at low wages. Finally, some forms of vocational education may be effective by making other employees more productive, or by enabling firms to adopt new technologies that they could not implement without a skilled labor force, but these possibilities again require that the occupations and industries for which programs train be carefully selected. In all these examples, the use of vocational education to stimulate economic development requires relatively precise targeting on the occupations and the firms which might expand employment and production, rather than general support of vocational education in the hopes that economic development will magically materialize.

With information on the effects of economic development efforts, a list of appropriate occupations and sectors could be devised. These would be targets for vocational education that would realistically expand employment and production rather than simply luring employment from one region to another. However, such information is not now available, partly because many economic development efforts are relatively new and partly because of the serious technical difficulties in carrying out such evaluations. For the moment, then, the only solution for those promoting the use of vocational education in economic development is to keep firmly in mind the goals of such efforts, the alternative models of economic development, and the conditions necessary for each of these model to affect employment, wages, and output.

Notes

[1] One of the few individuals writing about economic development to recognize the importance of the demand side has been David Osbourne (1987). See in particular his comment that "publicly subsidized training programs should be demand-driven" (p. 64).

[2] Historically, organized labor guarded its control over training and apprenticeship jealously precisely because of the negative effects an expansion of training could have on wages.

[3] The analysis in this section depends on a relatively conventional model of the labor market, in which wages equilibrate supply and demand. Many alternative theories of labor markets exist, however, and most of them pose even more serious problems for education as a mechanism of economic development. For example, in Thurow's job competition model, the number of jobs is fixed and workers compete for positions in a queue on the basis of their qualifications (rather than competing on the basis of wages). Then the effect of training some people is to move them up higher in the queue of job applicants and to save employers the costs of training—but since the supply of jobs is fixed, education cannot increase employment directly. In the signaling model developed by Michael Spence and others, schooling is not inherently productive but serves merely to signal which individuals are of greater ability; expanding education at public expense may decrease the cost of signaling one's ability (or even destroy the value of education as a signal, if cost differentials among individuals of different ability levels are eliminated), but it cannot expand the amount of employment. Various credentialing models also posit a labor market in which employers hire on the basis of educational credentials that have no intrinsic value, so again expanding education may help some individuals over others but cannot contribute to productivity and economic development. Not only is it necessary to examine the nature of demand in order to ascertain what role education might play in economic development, then; it is also necessary to see whether any of these other models explain the use of education in labor markets.

CHAPTER 4

ECONOMIC DEVELOPMENT AS CUSTOMIZED TRAINING

The recent interest in economic development has generated different ideas for vocational programs that might enhance economic development. A new attitude has pervaded much of vocational education, especially at the postsecondary level, in which educational institutions see themselves as driven more by the needs of employers than by other concerns. While somewhat amorphous, this approach is nicely illustrated by an anecdote about two postsecondary institutions approached by a particular company trying to decide where to locate. One institution responded that it would provide whatever training the company said it wanted—an offer which many would interpret as perfectly responsive to the company's needs. The second institution replied that it didn't know what it could offer, but that its representative would fly to the firm's existing production facility, study its methods and skill requirements, and thereby help the company define what its new training needs would be—a more active process in which the institution provides its expertise and assistance in the process of determining what training it can provide. Needless to say, the second institution is supposed to have won the firm to its region.

More concretely, when vocational educators rely on economic development as a "new" justification for expanded programs, they often refer to the specific practice of customized training—the provision of relatively firm-specific skill training for individual firms, and, therefore, a form of training which is more specifically responsive to a firm's requirements than are general vocational programs. Institutionally, customized training is provided in a variety of different settings. Many community colleges, postsecondary technical institutes, and area vocational schools provide training to specific firms, sometimes using regular funds generated by enrollments and sometimes using funds from federal sources including the Perkins Act and the Job Training Partnership Act (JTPA). The JTPA program itself provides support for work experience programs and on-the-job training, sometimes through educational institutions but often through community-based organizations, unions, and firms. The recent amendments to JTPA, in the Omnibus Trade Bill of 1988, will (if funded) expand federal funding for displaced worker programs and require that such programs be jointly devised with employers, strengthening the likelihood of firm-specific training. Finally, a number of states have devised their own training programs—like the Employment Training Panel in California, and the Bay State Skills Corporation in Massachusetts—many of which provided firm-specific training. Some

states (like Colorado) have a specific policy forbidding state funds in educational institutions from being used for customized training, though most appear not to have formulated any specific policy.

The variety of public funding sources is matched by variety of the training programs themselves. Some operate with substantial subsidies from firms, or firm donations of equipment, materials, space, and even instructors, while others appear to depend wholly on public subsidies. Some take place on a firm's premises, while others are located on the campus of a postsecondary institution or some third location. In some cases, the firm participates in choosing participants, while in others the institution providing the training recruits and selects the participants. Many customized programs operate with open entry/open exit schedules, though some also use the regularly scheduled programs of their institutions, operating on a standard academic schedule. Most customized training programs appear to be of relatively short duration, however, certainly shorter than the period required for a certificate program or an associate degree. Since there has not yet been a census of any kind, it is difficult to generalize about customized training; about the only certainty is that the number and variety of these programs has increased substantially over the past few years.

Customized training offers some obvious and powerful advantages to vocational institutions. One of the most important is the connection it provides to employers. A persistent criticism of vocational education is that it tends to become insulated from labor market developments, to rigidify into unchanging courses (like high school shop, clerical courses, and home economics) which ignore changes in employment and the skills required on the job. This accusation, most frequently leveled against high school programs, is also expressed by administrators in job training programs who complain that vocational education is too unresponsive to changing conditions, unwilling to vary the standard "academic" format of semesters, and insufficiently oriented to performance and placement. However, especially at the postsecondary level, the activity around customized training presents a very different image of these institutions: They appear flexible, responsive, creative in devising alternative formats for vocational courses, and willing to work with employers in customizing training rather than teaching courses in the same way to all students.

A second obvious advantage to customized training is that, where firms make contributions of equipment, they can help vocational programs keep up to date. Vocational programs all seem to have a hard time finding the funds to purchase equipment, especially

in high-tech areas where equipment is expensive and changes rapidly; most states provide relatively little funding for equipment, and most do not provide any funding differentials for the higher costs of certain vocational programs. While much of the program improvement funds of the Perkins Act are used for equipment, the amounts of such funds in most states are quite insubstantial, amounting to between two and four percent of postsecondary vocational budgets (Grubb, 1988). Therefore contributions of equipment or materials can be a real benefit to keeping vocational programs current.

Customized training also presents new opportunities for combining general and specific training. The balance between the two has always been an issue in vocational programs, but ways of integrating general or academic skills with more narrow, job-specific skills has been difficult to achieve, at least in vocational programs without a cooperative work component. But with customized training, students can enroll in general vocational courses and academic courses at the same time that they receive firm-specific training, in theory facilitating the integration of general and specific education. Whether many customized training programs take advantage of this opportunity is unclear; indeed, most of them appear to be too short, and too focused on the needs of firms, to pay much attention to such integration. But the opportunity to do so still exists.

Yet another advantage of customized training is that it provides an obvious placement mechanism. Community colleges have often been faulted for having weak placement efforts, and certainly they do not stress placement services to the same extent as either JTPA programs, with their placement-oriented performance standards, or welfare-to-work programs. But placement in customized training programs is almost certainly higher than in other vocational programs, providing obvious benefits to students and post-secondary institutions.

Finally, customized training may be socially efficient, as well as beneficial to firms and students. If there are economies of scale in training, then small and medium-sized firms cannot provide their own training except at enormous cost per worker. Indeed, it appears that most of the firms who have participated in customized training programs are small and medium-sized, turning to community colleges and technical institutes precisely because they are better organized to provide training, at lower costs for organization and overhead, than the firms are.

The most obvious benefit of customized training—the benefit to the firm, in the form of lower training costs and improved productivity—isn't clear until we know the

division of cost between the firm and the educational institution. If the firm pays the full cost of its specific training, then the advantage to the firm comes from the possible economies of scale, or perhaps from the greater joint productivity of specific training undertaken with general or academic education. If, on the other hand, the public sector pays for the majority of costs through its subsidies to community colleges and technical institutes, or through the recent state-funded job training programs, then the firm benefits from having its training expenses provided at public expense. Many programs of customized training justify their performance by evidence of decreased costs to firms, as if this were justification enough (see, for example, Fadale & Winter, 1988; State of California, 1986).

Customized training seems to have something for everyone, then: Students get appropriate training and then are placed, presumably at higher rates than in conventional vocational programs; firms get part of their training costs subsidized; educational institutions increase their enrollments, enhance their services to their communities, and strengthen their connections to employers; and (we hope) communities benefit from economic development.

Nonetheless, there are potentially serious drawbacks to customized training. One way to clarify the potential limitations of customized training is to ask how it might be expected to further economic development. One answer, of course, is that by lowering training costs it might lure employment from other regions—returning us to the smokestack-chasing model of chapter 1. But not only are there serious questions about whether relatively minor training subsidies can in fact have much effect on the location of firms, this kind of beggar-thy-neighbor policy is indefensible, from a national perspective, except in special circumstances. Indeed, customized training may operate to shift employment away from high unemployment areas: In California there are some indications that customized training programs in community colleges are helping to draw employment away from central cities and to suburban areas, exacerbating the problems of minority employment (Mertes, 1988).

There are three other relatively obvious objections to customized training. One involves its role in affirmative action, in gaining access to employment for minorities and access to nontraditional occupations for women. If the educational institution recruits and selects the individuals to be trained in a customized program, then we would expect there to be affirmative action policies in place; although they may not work as well as one would like, two-year colleges and technical institutes have been more committed to affirmative

action than almost any other sector of education. If, on the other hand, the firm recruits and selects trainees, or selects trainees from its existing labor force, then any patterns of employment discrimination within the firm may show up in the customized training program as well. Evaluations of customized training programs, therefore, need to consider the composition of the trainee pool, to ensure that existing policies designed to enhance the employment of minorities and women are not undermined. However, it is also important to recognize that when customized training is used for skills upgrading and retraining of existing workers who might otherwise be laid off, there is no alternative to having the firm select the trainees, and the issue of potential bias in the selection of trainees may be intractable.

Yet another practical concern about customized training involves a long historical battle over vocational education. A persistent criticism is that vocational education tends to become overly narrow and occupation specific, so that individuals trained are prone to become unemployed as production methods change and particular sectors decline (Grubb, 1979). The recent criticism of "narrow vocationalism" from the business community has been the most recent expression of this concern, which has generally led to efforts to broaden vocational programs and integrate them more firmly with academic components. The emphasis on flexibility in the labor force also argues for more general training (for other arguments for flexibility, see Doeringer et al., 1987; Spenner, 1988). But customized training—along with short-term JTPA programs and the job training programs sponsored by states—represents the contrary trend, in the direction of more specific and narrowly defined training. This generates the question of whether customized training programs are in the *long-run* interests of employees and employers, or whether they simply serve to provide short-term training which is quickly made obsolete. If so, then their effects on wages and on economic development may be short-lived and illusory.

A third possibility is that customized training merely substitutes for the training which firms would otherwise provide themselves. For example, in an examination of customized training in New York, thirty-four percent of firms would have provided training in the absence of customized training, and another forty-five percent would have purchased training elsewhere; only twenty percent reported that they would not have provided training (Fadale & Winter, 1988, p. 11). This implies again that the customized program provided a simple subsidy to most firms, but no change in their training or in subsequent productivity.

These potential problems with customized training are relatively concrete, and—in principle at least—easy to evaluate. However, there are other less obvious problems with customized training that are also more difficult to evaluate. If customized training is promoted as a way of enhancing local employment rather than smokestack chasing, then the appropriate question is how it might be expected to increase employment, and by how much. From the simple microeconomic analysis in the previous chapter, we concluded that the effects of any training program on the employment and wages of trainees depend crucially on the nature of demand, and that efforts to use vocational education to enhance employment and production should target their efforts on specific occupations and sectors. These conclusions apply to customized training just as much as they do to other forms of vocational education.

A special danger arises from the nature of customized training, which almost by definition prepares workers for positions requiring significant amounts of firm-specific training. In the presence of firm-specific skill requirements, demand for workers will be less sensitive to wages than in the case for workers not requiring specific training; furthermore, empirical estimates indicate that demand is particularly insensitive to wages for nonprofessional or nonmanagerial employees (Stern & Grubb, 1988). Thus the danger is that the types of occupations which are usually the targets of customized training programs may be those for which training is least effective as a way of increasing employment, and which increase employment only by reducing wages substantially.

This analysis points up another problem involved in the public subsidy of firm-specific training. Within economics, a convention has developed that firms should pay the costs of firm-specific training, since they reap the benefits; and that individuals, or government, should pay only for relatively general training (Becker, 1975, chap. 2). Firms have no incentive to pay for the general training of their employees, because their employees could then leave to receive higher wages elsewhere. Conversely, government subsidy of firm-specific training will be inefficient, since by lowering the costs of training it will induce firms to hire more workers than it otherwise would and to provide them too much specific training. However, government subsidy of specific training will increase both wages and employment more than the simple expansion of a vocational program in the absence of a specific training component would, precisely because it increases the demand for trained workers by the firm as well as increasing the supply of trained workers. (These conclusions are developed in greater detail in the Appendix.)

This creates a dilemma for public policy: Customized training is likely to have more positive effects on employment and earnings than do conventional education programs, and thus may be superior from the perspective of economic development; but *if* government subsidizes the entire cost of customized training then customized training constitutes a public subsidy of private training, a subsidy from taxpayers as a whole to firms and students, and its costs to government will outweigh its benefits to the individuals trained and to firms. This conclusion suggests that, because there have been strong political constituencies for economic development, and because of the growing notion that firms should be the primary "clients" of vocational education, there may be strong pressures for public subsidy of firm-specific training even when this may not be in the public interest.

Examining a Sample of Customized Training Programs

There are, then, many potential benefits of customized training, but there are substantial dangers as well. One way to disentangle which of these predominate is to examine some customized training programs to see whether or not they exploit the potential of customized training and avoid the pitfalls, and to examine the recent state-funded job training programs which often support customized training. In the absence of any "census" of customized training efforts, we have examined a group of programs which applied to the American Association of Community and Junior Colleges for its "Keeping America Working" awards, given annually for innovative cooperative efforts between community colleges and technical institutes and employers.[1] Admittedly these are not a random sample of cooperative efforts, but rather those which consider themselves good enough to vie for a national award; it is possible that they do not reflect the general patterns of customized training in this country. Still, they represent the efforts of some forward-looking educators and businesspeople to develop partnerships, and there is probably more to be learned from them than from mediocre programs.

These various partnerships were initiated by firms in about half the cases, initiated by the educational institution in about one quarter of the cases, and jointly devised—often because of an on-going history of collaboration—in the remaining quarter of cases. The process of initiation, therefore, seems to be a two-way street, with both firms and postsecondary institutions initiating programs in different cases. Most of the time—in at least two-thirds of the cases—the "client" was an individual firm, but in about ten percent

of cases a group of firms constituted the client, while the remainder of arrangements involved either government agencies or groups of firms and government agencies.

In cases where the client was a single firm, about two-thirds of the firms involved were national and international companies, and only a third were purely local or regional firms. This finding suggests that customized training efforts have not concentrated on small and medium-sized firms of purely local or regional scope but have instead worked extensively with larger firms. The implications for economic development are not clear, though the large number of programs with national firms may suggest a strategy of chasing after the branch plants of national firms—a variant of smokestack chasing—rather than helping local firms expand.

Most of the firms involved in customized training were engaged in manufacturing, in a striking diversity of sectors. The other common sector of economic activity included firms involved in transportation, including trucking firms, bus companies, and railroads. Very few of these projects involved service activities, retailing, wholesaling, or professional firms. The sectors involved in these customized training efforts seem to be consistent with targeting sectors likely to generate exports.

The vast majority of these partnerships—about eighty percent—focused on training, but a few provided assessment and counseling and others included the development of a training facility or resource center that the firms then operated on their own. For those that concentrated on training, about half relied exclusively on customized training; a very few relied exclusively on courses that the college or technical institute offered to the public at large, but most of the remaining half relied on a combination of customized training and existing courses. Of course, reliance on both existing courses and customized training provides special opportunities for combining general or "academic" preparation with firm-specific preparation, though it doesn't prove that integration in fact takes place. (In subsequent examination of these partnerships we will examine the extent to which customized training and existing courses are integrated in some way.) Almost all the training was directed at job-specific skills, though a very few of the partnerships included nonspecific education including "workplace literacy" courses designed to improve basic skills and a few enrichment or refresher courses.

The location and provision of training also illustrates the the variety of arrangements which have taken place. In about half the cases where location was identified, the training took place at the college; in another quarter the firm's facilities were used, and in the

remaining quarter training took place at both the firm's facilities and the the college. In perhaps sixty percent of the partnerships the college provided all the instructors, in perhaps ten percent instruction was evenly divided between college instructors and the firm's employees, and in the remaining cases the firm provided some assistance in providing trainers. The provision of equipment was similarly varied, with the college providing all materials in about half the cases, the firm and the college jointly providing materials in slightly over one-third of the programs, and the firm providing all materials in the remaining cases. Very roughly, then, in about half of these examples of customized training, the educational institution provided the location, instructors, and materials, but in the remaining half there were contributions of facilities, instructors, and materials by the firms involved, with "partnerships"—a rough division of contributions—more common in these cases than contributions by the firm alone.

In about one-third of the cases where the reason for collaboration could be identified, firms needed additional employees in particular occupations that were unavailable in the area, indicating that remedying skill shortages may be the most important purpose of customized training. Another quarter of cases required new skills because of technological change, and about one-fifth provided retraining to existing workers to avoid potential layoffs, particularly in cases where firms changed the kind of production taking place in a local facility.

Obviously the interests of the firms involved was foremost in these projects, but in at least six of the forty-five partnerships examined the firm intended the training program to benefit particular groups with special employment needs including the handicapped, high school dropouts, and AFDC recipients. In these cases the training often focused on "employability skills," including assessment and training aimed at helping individuals to develop appropriate work-related attitudes and effective job-seeking skills and to identify their vocational interests and training needs.

The selection of individuals for training is often unclear. Where the method can be identified, the firms involved chose participants about half the time, the educational institutions chooses participants about one quarter of cases, and there was joint selection in the remaining quarter of cases. Of course, for those programs that involved retraining to prevent layoffs or skills upgrading to meet the requirements of new technologies—which represented about forty-five percent of these programs examined—selection by the firm is all but unavoidable. While the potential problem of discrimination in customized training programs exists, then, it appears that the educational institutions play a role in selecting

participants in most cases of entry-level training, and so possibilities for discrimination may not be especially serious.

The funding of these customized training programs is difficult to ascertain, and multiple funding sources exist in at least half of these efforts. However, the firms involved (or the firms and their labor unions) provided the major funding in about half these programs; the state provided major funding in one-third of the cases, the college itself in slightly over ten percent of cases, and the JTPA in another fifth. In addition, at least some of these projects benefited from indirect government subsidies: Several built training facilities with industrial development bonds, which have lower interest rates because of their tax-free status and, therefore, involve federal and state subsidies. Most of these programs are supported by government resources in some way, therefore, though the relative balance of public and private funding remains unclear.

Another source of information about funding patterns comes from the state-funded job training programs that have been enacted recently, many of which provide resources for community colleges and technical institutes to provide customized training. In about one-third of the states that have established job training programs related to economic development, there is a requirement that the firms involved match public contributions dollar for dollar, insuring that the state pays fifty percent or less of the total cost.[2] Thus there have been safeguards, at least in some states, to assure that firms cannot simply support private training at public expense. The sharing of costs is also a mechanism by which firms can pay for the specific aspects of training while the state pays for more general aspects and for the public benefits.

The most elusive aspects of the customized training programs we reviewed are their outcomes. Clearly there are many educational institutions and firms that are pleased with existing programs,[3] but there is no other evidence about placement rates, earnings, long-term employment of participants, or changes in the firms' productivity. In some state programs, the concern with the firm as the principal client and the desire to make firms as receptive as possible to public programs have led to efforts to minimize red tape and reporting requirements, reducing the information available about any aspects of programs (Stephens, 1987). Some have argued that the satisfaction of firms with existing arrangements is all that matters, and other measures of outcomes are superfluous. But this position is surely extreme: If the purpose of customized training is to promote economic development, as measured by employment gains in an area, earnings increases, firm productivity, and overall production (or regional product), then it is insufficient to know

simply whether firms are pleased with the results of vocational education and training. Over the long run it will be necessary to develop better information about the effects of these programs, for different groups of individuals, under varying economic conditions.

However, even this brief review of a small and nonrandom sample of customized training programs reveals how much is going on. Many of the programs have the potential for exploiting the potential strengths of customized training programs: They appear to be genuine collaborations between employers and educational institutions, and many have real potential for combining firm-specific and highly customized training with more general education. The potential problem of bias in selecting applicants may not be a serious issue. In general there appears to be a division of costs between the public and the private sector, rather than large numbers of cases where the public sector bears the costs of wholly private training. The effects of these programs on the the long-run employment of participants and on the productivity of employers remain unknown, but the structure of existing programs seems to live up to many of the claims made on behalf of customized training.

Notes

[1] There are forty-five programs in the sample examined initially, including all those who applied to the AACJC in 1989. This analysis has been carried out by Robert Lynch at the AACJC, with support from the National Center for Research in Vocational Education. In subsequent research, he will gather additional information about these KAW projects as well as developing a more comprehensive "census" of economic development efforts in community colleges and technical institutes.

[2] There is a 1:1 match in the programs in Idaho, Kansas (for retraining only), Kentucky, Massachusetts, Missouri, New Mexico, and Ohio; the 1:1 match in Delaware and New Jersey can be waived in some circumstances; and Indiana's Basic Industry Retraining Program pays twenty-five percent of the costs. In the other twenty or so states with programs there are no contributions required from businesses, though what contributions firms make in practice is unknown. See Grubb & McDonnell (1989, table A.1).

[3] Of course, the bias in our sample—its restrictions to those that have nominated themselves for the KAW awards—will generate more bias in comments about how well programs are working than in other descriptions of programs.

CHAPTER 5

ECONOMIC DEVELOPMENT AND TECHNICAL ASSISTANCE TO FIRMS

Aside from customized training, the other major examples of novel economic development efforts involving educational institutions include technology transfer programs and small business development centers. These programs, less widespread and well developed than customized training, provide technical assistance to small and medium-sized firms about the use of new technologies, computer software and hardware, budgeting, accounting, personnel practices, and many other aspects of running businesses. The kind of technical assistance provided may be quite sophisticated, in the case of technology transfer centers, though the advice that small businesses may seek can also include the simplest aspects of running a business.

Such technical assistance efforts involve community colleges and technical institutes in new services, beyond their traditional function of education. While an institution may provide vocational training in conjunction with technical assistance—for example, it may provide CAD training after it helps a firm choose which CAD system to purchase—the novel aspect of these programs is the technical assistance. These programs are the analogues to the university-based "partnerships" which have emerged in the past decade or so, providing research and technical assistance about new technologies including computer applications, electronics, robotics, genetic engineering, and new materials. In many ways such efforts are the modern counterparts of the agricultural extension service first established in the nineteenth century, providing information about new developments to farmers who would otherwise be isolated.

From the perspective of economic development, we can understand technical assistance programs as efforts to remedy a particular kind of market failure. In the conventional microeconomic model of perfectly operating markets, information is universally available; therefore, all firms are well informed about new developments and can decide whether to use them or not based on the expected costs and profits they will generate. In practice, however, information does not flow quite so freely, and many firms may be ignorant of developments which might increase their productivity. Technical assistance, therefore, improves the flows of information, particularly to those small or isolated firms for whom acquiring knowledge is the most difficult, providing these firms access to potentially more efficient production methods. In fact, many technology transfer

programs have developed in rural areas where information about new developments is hardest to get.

If firms adopt new methods because of technical assistance efforts, increased productivity can be expected to increase the returns to capital and the wages of most workers in the firm.[1] If the price of output falls and demand is sensitive to price, then increased demand will follow, further enhancing employment. If the firm involved is also one that exports goods and services from the region, or replaces imports from other regions, then the region's product and income will increase. Given the relatively low cost of providing information, the potential benefits that may flow from technical assistance efforts seem large indeed.[2]

It is still much too early to think of evaluating such efforts to provide technical assistance. Small business programs are recent developments, and many technology transfer programs are only in the planning stages. As in the case of customized training, there has not yet been any attempt to survey existing programs, to see what kinds of institutions are most likely to sponsor such efforts, which firms ask for what kinds of assistance, what the immediate results of such requests are, and—most difficult of all to establish —what the effects on economic development are.

Nonetheless, there are still some perspectives about technical assistance that the previous conceptions of economic development can provide. In particular, if technical assistance goes to firms which export from a region, or which produce goods and services that would otherwise have to be imported from outside the region, then its positive effect on regional income and product is relatively clear. If, on the other hand, such technical assistance helps some firms which primarily compete with other firms in the same region for an internal market, then the effects on regional development are not at all certain. For example, a small business center might provide help to a small retailer. Such efforts might have positive effects on competition, by stimulating more firms to develop and survive; and they might have good distributional effects, if the new retailer hires minorities and women, or individuals from a depressed rural or ghetto community. But otherwise such efforts would simply support business and employment in one retailing firm rather than another, since any increase in business to the firm helped by technical assistance would be matched by reductions in other firms. A redistribution of business activity would take place, but there would be no enhancement of overall economic activity.

As in other areas where vocational education promises to enhance economic development, technical assistance has real promise. Under certain circumstances, however, it merely rearranges economic activity, benefitting some at the expense of others; and while some of these changes have positive distribution effects, many do not. For the future, the trick will be to disentangle those situations in which technical assistance is more likely to be effective in enhancing economic economic development from those where its influence is merely to shuffle existing efforts.

Notes

[1] If the new production or business methods induce the adoption of new forms of capital, then the wages of those workers who are complementary to capital will rise, though some workers—those for whom the new capital is a substitute—will see their wages and employment fall. It is possible, then, that technical assistance programs may cause the distribution of earnings to become more unequal—a common complaint about new technologies generally.

[2] It might be objected by a believer in the free market that there is optimal distribution of information, in the sense that firms consider both the potential costs and benefits when they decide whether to find out about new technology. From this perspective there is no reason for government intervention to improve information flows, since doing so would only artificially depress the price of scarce and valuable resource information. This view assumes that ignorance is a well-considered and economically rational decision, and that the costs of better information outweigh the benefits. The contrary view, of course, is that ignorance is simply ignorance, and that the potential benefits of technical assistance far outweigh the trivial costs involved.

CHAPTER 6

SOME IMPLICATIONS FOR FURTHER RESEARCH AND POLICY

Economic development has been the Holy Grail of the 1980s. With economic decline in many regions of the country and without national leadership on economic policy, states and localities have searched (sometimes desperately) for policies that would arrest their decline, help them expand, or help them benefit from the booms in other regions of the country. But like the Grail, economic development remains elusive. While rhetoric about the need for economic development may help justify new programs with some promise (like the new state job training programs, customized training, and technology transfer centers), in other cases rhetoric simply masks a lack of clarity about the goals of a program and about the ways it can enhance employment and productivity.

One implication of our analysis is that vocational programs intended to enhance economic development should be more systematically evaluated, since not all such programs will enhance employment, earnings, income, or regional production—even in cases where they satisfy all the immediate participants. The evaluation of economic development efforts is still in its infancy, partly because such evaluations are technically quite difficult, and examining the effects of educational programs is notoriously hard. Still, the variety of vocational programs that have emerged recently in the name of economic development is astounding, and they provide examples for efforts to disentangle what works and what doesn't.

In particular, there is now very little understanding of some of the newest developments—customized training programs, other partnerships between postsecondary vocational and industry, technology transfer programs, small business development centers, and other forms of technical assistance. One obvious step would be to undertake systematic surveys of such efforts, to ascertain their intentions, the kinds of firms they help, the division of costs, and the potential effects.

Yet another would be to induce more vocational programs—including these new programs—to evaluate their own consequences, as a way of building up increasing amounts of information about the effects of such programs. This would be part of a much larger agenda to increase the amounts of information available about the effects of vocational programs for students completing them and for the firms in which they work.

Until more information is developed on the effects of different types of economic development efforts, there can be only the sketchiest implications for policy. However, one obvious conclusion is that states and the federal government need to be concerned with economic development efforts that merely reallocate existing employment among localities and states, rather than adding to employment and productivity in the aggregate. While the conventional wisdom is that smokestack chasing is outmoded as a model of economic development, there are still many anecdotes (as well as nationally publicized efforts of states to snare such prizes as the super conducting super collider and the Sematech Corporation) suggesting that these beggar-thy-neighbor practices have not been abandoned. The persistence of smokestack chasing can be traced to an imbalance between local incentives and state purposes—where community colleges have every incentive to increase local employment, even at the expense of another region within the state—or between state incentives and national goals. Therefore, the only long-run solution is for state governments and federal policy to counter these incentives, at the very least by insuring that their resources are not used for smokestack chasing.

Another recommendation involves the need for more careful targeting of economic development efforts. While it has the potential for enhancing productivity, and doing so without increasing prices or inflation, vocational education does not *automatically* lead to such benefits since the nature of demand limits its effects. If demand is insensitive to price, then increases in employment and wages from either training or retraining are likely to be small, implying that vocational programs should be targeted on those occupations for which demand is relatively responsive to supplies of trained workers and to wages. The use of vocational education to alleviate skill shortages again assumes that vocational programs are targeted only on those occupations for which skill shortages are known to exist (and not merely on occupations for which employers complain about their inability to find enough workers at low wages). Similarly, the use of vocational education as part of a strategy to stimulate exports, or reduce reliance on imports, requires limiting public subsidies only to certain sectors of a local economy. Targeting of vocational education on the occupations and the firms which might expand employment and production, rather than supporting vocational education in general with the hopes that economic development will magically materialize, is still unfamiliar to most (but not all) states, but it is an obvious corollary of realizing that some vocational education for certain occupations and sectors is unlikely to enhance economic development.

Another obvious recommendation is that governments at all levels should continue to stimulate demonstration projects and "experiments," encouraging postsecondary institutions and job training programs to develop innovative approaches—and then to evaluate these efforts carefully to ascertain their consequences. In the past such evaluations have been infrequent, and even the federal government has avoided much evaluation of vocational programs. For example, some program improvement funds available through the Perkins Act could be earmarked to evaluate the effects of different vocational programs on economic development,[1] and the results would be instructive to institutions deciding which programs to institute. In addition, states can undertake their own demonstration projects, as they frequently do when they develop pilot programs or novel approaches to job training, using either state resources or federal funds from the Perkins Act and the JTPA.

The postsecondary institutions providing vocational education and training are now like laboratories—laboratories of educational experimentation, trying new program models, new approaches to old problems of preparation for work, and new methods of working with firms and with other training agencies. The amount of ferment in this area is astounding, indicating both the importance of this subject and the creativity which educators and employers are bringing to new models. Some of these experiments will prove not to work, while others will undoubtedly be judged successful and then institutionalized in state and federal policies. But such discoveries are part of the normal process of developing new approaches and techniques. What counts for the moment is that there is so much activity from which to develop the next generation of vocational programs.

Notes

[1] For the proposal that federal support of postsecondary vocational education support more "coordinated social experimentation," see Grubb (1988).

APPENDIX

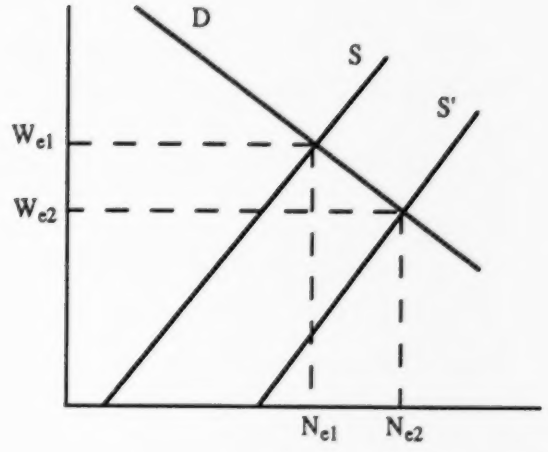
THE SIMPLE MICROECONOMICS OF VOCATIONAL EDUCATION

In the simplest model of what vocational education and training (or indeed any form of education which enhances productivity) accomplishes, untrained individuals with low marginal productivity—and, therefore, low wages—are converted into workers with higher marginal productivity and wages. In the supply and demand diagrams in Figure A1, untrained workers are trained, shifting supply curves in both the markets for educated and uneducated labor from S to S'. Now the wages of workers trained increase, from W_{u1} to W_{e2}, and employment increases in the market for trained labor (and falls in the market for untrained labor). Wages have increased among the newly educated workers, and employment in more productive occupations has increased, and so economic development seems to have occurred.

But of course there are many more effects of training, and several conditions necessary to the realization of these effects. The most obvious is that vocational education in this model acts to increase employment by increasing the supply of trained workers and decreasing wages. Indeed, total wages to trained workers may even fall if the decrease in wages is too great; this will happen if the elasticity of demand for trained labor is, in absolute terms, less than one.[1] Furthermore, while there are positive employment effects for trained workers from the program—because employment increases from N_{e1} to N_{e2}—the increase in employment is not as large as the number of workers newly trained (which is equal to the horizontal shift of the supply curve). Either some of those newly trained do not find employment in the areas for which they have been trained—a constant problem in vocational education, leading to a concern with placement rates—or some of those formerly working are displaced by newly trained workers, a displacement effect that may be difficult to measure.

In Figure A1(a), there is an obvious wage advantage of trained workers over untrained workers; this kind of prediction leads to evaluating vocational programs in terms of their earnings advantages to those who have completed them. However, if access to a training program in unlimited, then supply will continue to shift out of untrained occupations into the training program, so the supply curve S' will continue to shift to the right in the market for trained labor and to the left in the market for untrained labor. This

Educated Workers



Untrained Workers

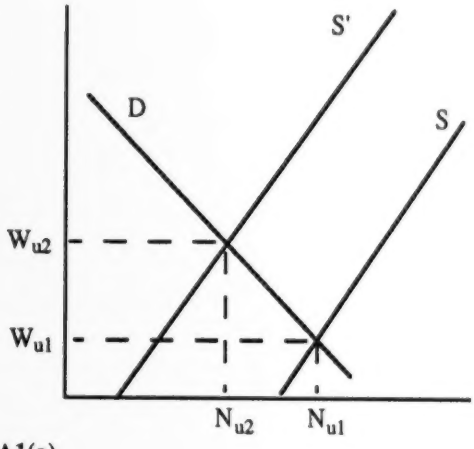


Figure A1(a)

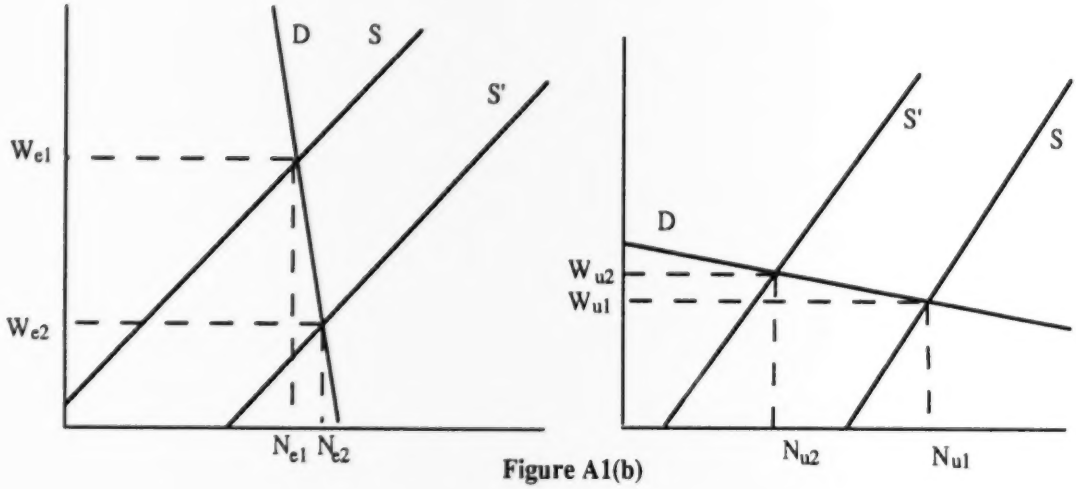


Figure A1(b)

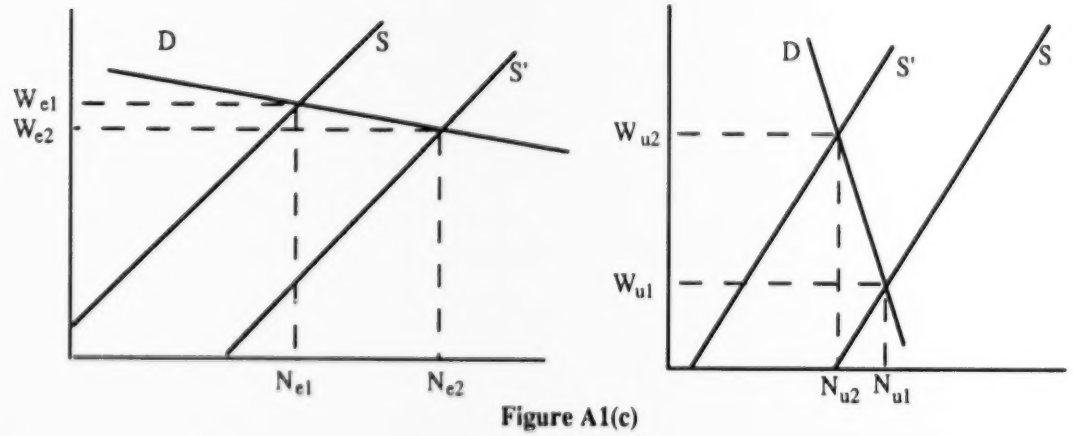


Figure A1(c)

can continue until wages in the two occupations are equal—that is, until the earnings advantage associated with training has vanished. In this case, evaluating the effects of training by examining earnings differences associated with training will suggest that there are no benefits from training; but employment in trained occupations has increased, and the real benefits are captured by employers in the form of higher profits (that is, in higher consumers' surplus).

As can easily be seen by rotating the demand curves in Figure A1(a), the employment effects of vocational education decrease and the fall in wages is greater as demand becomes more inelastic—and vice versa. Figure A1(b) illustrates the effects of a shift in the supply of educated workers because of increased public investment in education in a case where demand is price-inelastic. In this case wages fall rather drastically, employment in skilled positions is increased only slightly, total wages in skilled positions fall, and overall employment may actually decrease if employment in the unskilled positions declines more than employment increases in skilled positions. Employers benefit enormously from the fall in wages, but several conventional measures of economic development—especially the unemployment rate and total earnings—would not show any improvement. The contrary case exists when demand for trained workers is relatively price-elastic, as in Figure A1(c), when skilled employment and wages of newly trained workers increase. In effect, the view that increases in vocational education programs will lead to increased employment in related occupations, but without wage decreases, assumes the relatively elastic demand of Figure A1(c).

Retraining Workers

Another attractive strategy is to use vocational education to provide retraining of displaced workers. Analytically this situation is precisely like that depicted in Figure A1(a), since we can think of displaced workers as untrained relative to the occupations (including emerging occupations) for which training is required.

Education in the Case of Increasing Demand

A rather different scenario recognizes that the economic world is not static, as Figure A1 assumes, but that technologies can change and thereby shift demand. In particular, the availability of well-trained workers at lower wages, as the result of

increasing vocational programs, may cause the next generation of technology to use more skilled workers. That is, as Figure A2 shows, the initial increase in vocational programs lowers the wage to *W*2; this then stimulates the development of technologies using higher

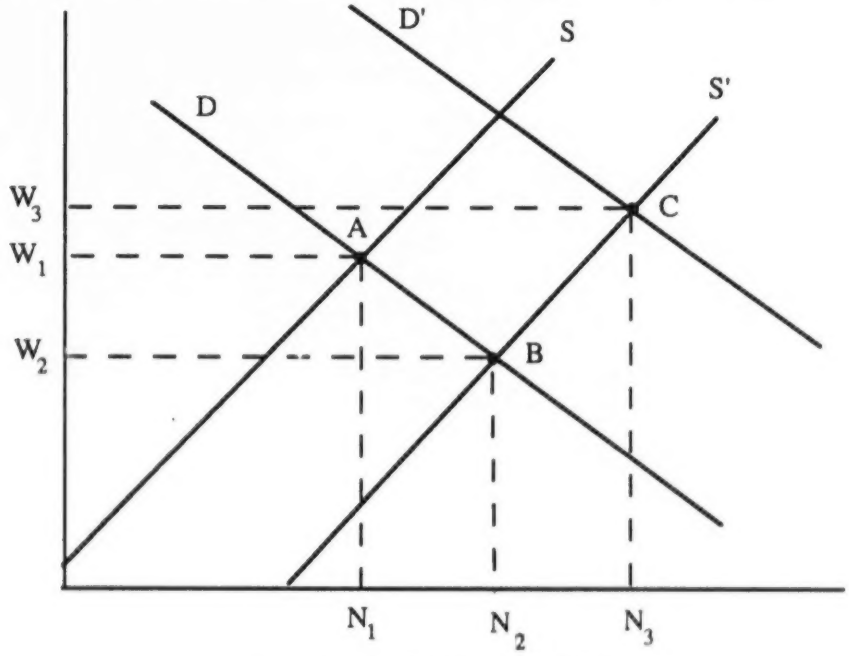


Figure A2. Educated Workers

proportions of skilled labor, shifting demand in Figure A2 to *D'*, resulting in an equilibrium at *C* rather than *B*. At this final equilibrium both wages and employment in trained occupations have increased. (Of course, the final wage W_3 can be higher or lower than the initial wage W_1, depending on the relative magnitude of shifts in demand and supply, but W_3 is unambiguously higher than the wage W_2, which prevails in the absence of a technologically induced demand shift.) The only question in this model is whether there is in fact a long-run shift in technology in response to the initially lower wages, and how large that shift might be.

Eliminating Shortages

Another commonly mentioned purpose of vocational education is to eliminate shortages. However, the term "shortage" is usually used quite loosely, rather than specifying whether shortages exist at specific wage levels; and it becomes necessary to ask why wages don't change to restore equilibrium if shortages at some wage level do

appear—for example, as a result of demand shifts. In Figure A3, from an initial equilibrium at *A*, an increase in demand from *D* to *D'* shifts the new equilibrium to *B*, and—as long as the supply of workers is responsive to wage increases—a wage increase

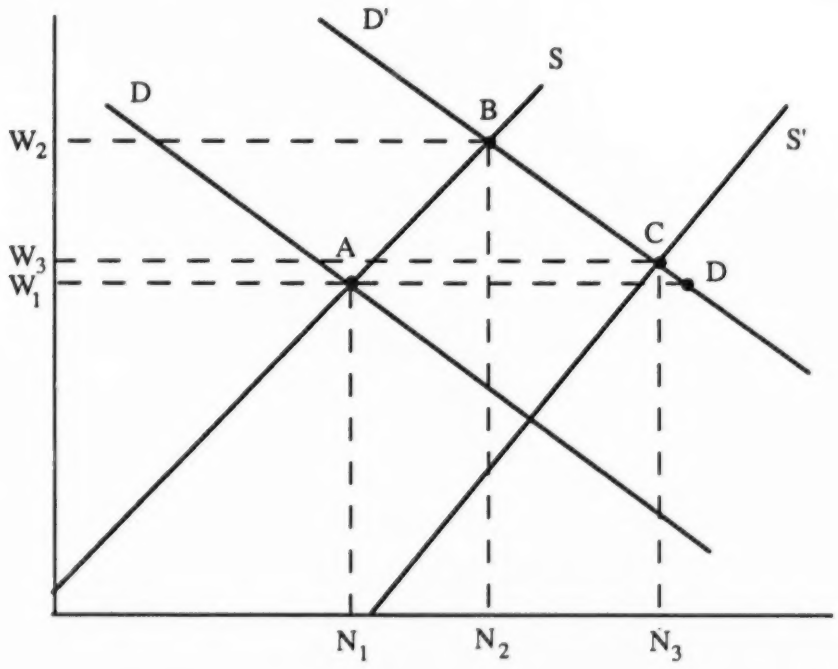


Figure A3. Educated Workers

from W_1 to W_2 will restore equilibrium. But if employers maintain wages at the old level W_1, because of an institutional unwillingness to increase wages, a shortage will develop (equal to the distance from *A* to *D*). Then increasing vocational education programs to increase the supply of labor in this occupation (from *S* to *S'*) can increase employment at some new wage like W_3 close to W_1 and a new equilibrium *C*. While this response increases employment over the free-market outcome at *B*, it does so only by lowering wages from W_2 to W_3, and in the process increasing the profits of employers (as can be seen by examining the change in consumer surplus, which in this case goes to employers). In essence, the shift from *S* to *S'* in Figure A3—perhaps as a result of employers complaining about "shortages"—is a policy of accommodating any demand shift so that wages need not increase.

Another reason why shortages might develop is that there are nonprice barriers to increasing the supply of workers. In terms of Figure A3, the increase in the supply of

workers necessary to move from *A* to *B* either cannot take place or does so extremely slowly. In the extreme situation, the supply of labor may be perfectly inelastic; this would correspond to cases where there are no workers whatsoever with particular skills, and this is likely to occur in cases of new and emerging technologies and in certain areas of the country (like isolated rural regions). In this case some exogenous increase in the supply curve, to *S'*, may be the only way to get to a new equilibrium.

Providing Specific Skill Training

The provision of firm-specific training increases the productivity of workers to that firm only. Specific training has the effect of shifting the demand for workers to the left, because specific skill training (normally paid for by the firm) in part compensates for fewer workers; in addition, specific skill training makes the demand for workers less elastic.[2] Now we can examine the effects of a program of expanding vocational education under five different assumptions about what vocational education does:

1. A vocational program increases the supply of trained labor in the absence of firm-specific training. In the terms of Figure A4, the relevant demand curve is *D'*; the supply function shifts from *S* to *S'*; the equilibrium moves from point *B* to point *D*, with more employment in the occupation for which vocational education is provided but at a lower wage. This is essentially the analysis of Figure A1.

2. A vocational program increases the supply of trained labor in the presence of firm-specific training. Then the demand function is shifted to the left and is more inelastic, compared to the first case. In terms of Figure A4, the relevant demand curve is *D* rather than *D'*, and the exogenous shift in supply from *S* to *S'* (with equilibrium changing from *A* to *C*) causes a smaller increase in employment and a sharper fall in wages, compared to the case without specific training. In effect, the firm captures more of the benefits of vocational education because it will translate any increase in the supply of educated workers into an increase in specific training, the intramarginal benefits of which it captures.

3. A vocational program increases the supply of trained workers as well as providing the firm-specific training necessary for these new workers. This happens when a vocational institution combines the more general coursework available to all students with customized training specific to particular employers. In this case, the

supply curve for trained labor shifts out, from *S* to *S'*; but in addition the subsidy of the costs of firm-specific training shifts the effective demand curve from *D* to *D'*, the demand curve that governs when the firm need not pay for any firm-specific training. The equilibrium shifts from *A* to *D*; compared to case 2, the employment effects are more substantial, and wages may not decrease (or will not decrease as much). Indeed, the more important the specific component of the vocational

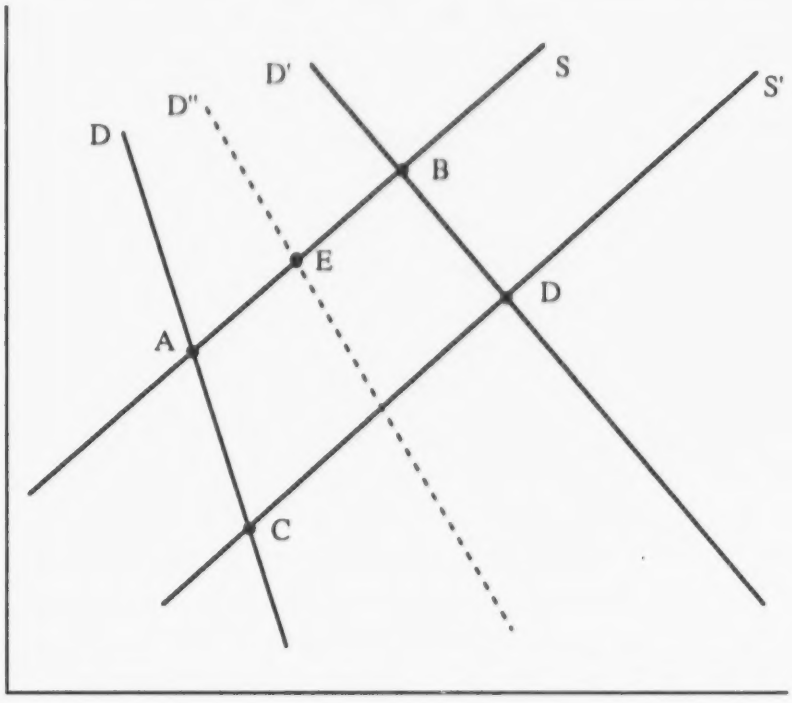


Figure A4.

program, the greater the shift in the demand curve, and wages may actually increase. The intuitive reason for this outcome is that relieving the firm of the cost of providing its own specific training allows it to put more resources into the hiring of additional workers.

One problem with this solution is that it is inefficient. The firm will hire too many workers (since it doesn't have to cover the marginal costs of their specific training) and then—since the marginal cost of specific training is literally zero—will want to press the vocational program to increase the amount of specific training provided to the point where all benefits are exhausted. In practice, of course, the amount of specific training provided at government expense will be a subject of negotiation

between the educational institution and the firm and will be limited by the public revenues available to the institution. Still, the point remains that if an educational institution offers to provide a firm not only with generally trained workers for particular occupations but also to provide specific skill training, then the firm's incentive will be to press the institution for high levels of specific skill training, high enough to exhaust all benefits.

4. The vocational program can provide firm-specific training to the firm's existing workers but not increase the number of workers with vocational education. This is the model of customized training, where a community college or technical institute will provide specific training for a firm; it is also a common model in industrial start-up training designed to lure employment from other states. In this case the firm's effective demand curve shifts from D to D', but there is no exogenous increase in the numbers of vocationally trained workers, so the supply curve remains stationary at S. In this case, the firm's equilibrium will shift from A to B; relieving the cost of specific training allows the hiring of more workers. They can also be paid more because, even though their marginal product will fall, the firm no longer has to cover the costs of training as well as wages. Thus both employment and earnings effects are positive. As in case 3, the final equilibrium is inefficient, because the marginal costs of training have not been properly considered in determining the final equilibrium, and the firm not only hires too many workers but also has an incentive to press the educational institutions for specific training to the point where the marginal benefit equals zero, rather than to the efficient point where the marginal benefit equals the marginal cost.

5. A different argument about the public provision of specific training is that the cost of providing such training in community colleges and technical institutes is lower than it would be for individual firms, because educational institutions already have the facilities, the instructors, and the knowledge of how to design instructional programs. In this case the firm's effective demand curve would be D'', intermediate between D and D'. If the firm pays the costs of training, then the efficient equilibrium would be at E, compared to A if the firm provides its own training; then the lower costs of training in the public sector allows expansion of both employment and earnings. If, on the other hand, the public sector picks up the cost of training, the equilibrium will be at B compared to A (as in case 4), which is

again inefficient relative to E because the marginal costs of training have not been correctly considered by the firm.

From these five cases we can see how powerful the incentives are to provide specific training, instead of or in addition to general education, as long as vocational programs are judged by the earnings and employment of their graduates. As long as vocational education is evaluated in terms of the employment and earnings of those individuals for whom training is provided, then the employment and earnings effects are greatest when a program either subsidizes specific training (in cases 4 and 5) or provides both general vocational training and the associated specific training (case 3). When the program provides only general training, in cases 1 and 2, then any increase in individuals trained for a particular occupation can be absorbed only by lowering wages. In addition, the amount of the increase in employment will be limited by the elasticity of demand—which is likely to be especially low for occupations where there is some specific training.

Notes

[1] Of course, there is also a general equilibrium analysis possible, examining the effects on total wages in both the trained and the untrained occupations; then the effect of training depends not only on the elasticity of the demand for trained labor but also on the elasticity of demand for untrained labor.

[2] The arguments in this section are developed at greater length in Stern & Grubb (1988). Figure A4 is also taken from that paper.

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